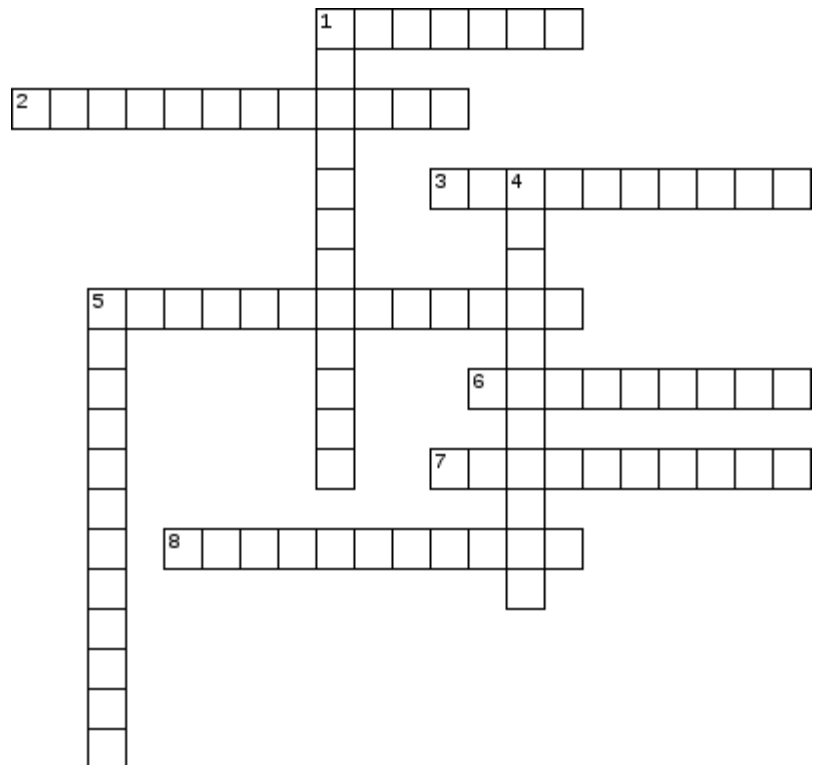
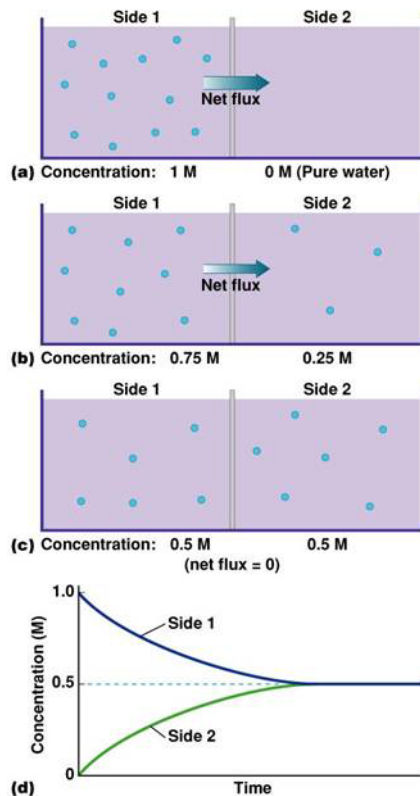
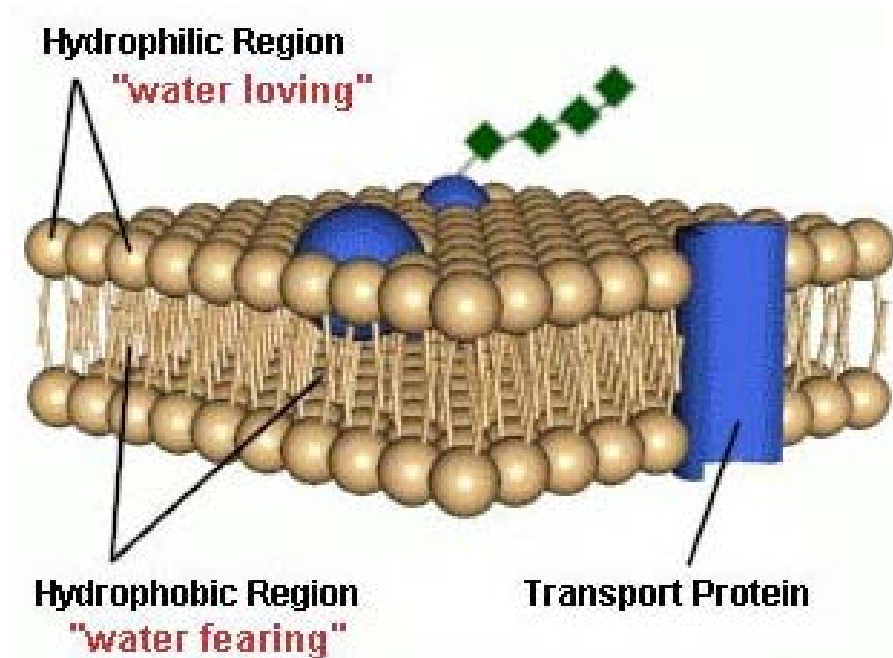


Unit 4 Cell Membrane Structure & Function

Term 3

11-12



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Across Clues

- _____ transport does not require energy.
- Cell membrane is a double-layered sheet called a _____.
- When the concentration is greater outside of the cell, _____ occurs.
- The mass of solute in a given volume of solution is called _____.
- When the concentration is lower outside of the cell, _____ occurs.
- Process of releasing large amounts of material from the cell is called _____.
- Process of taking materials into the cell is called _____.

Down Clues

- Cell method of ingesting solid food.
- Cell method of ingesting liquid.
- Selectively permeable membrane in cells.

Unit 4 : Cell Membrane Structure and Function
"Cells and their Environment"

<i>Unit Must Knows</i>	<i>Key Vocabulary</i>
<p>1) Students will be able to understand and describe the concept of passive transport and cell regulation.</p> <p>a) Diffusion is the random movement of a substance across the concentration gradient, from an area of high concentration to an area of low concentration.</p> <p>b) Osmosis is a special case of diffusion through a semi-permeable membrane that only occurs with water, due to hypertonic, hypotonic, and isotonic conditions.</p> <p>c) Facilitated diffusion uses carrier proteins to transport specific substances- amino acids, across the cell membrane, using the concentration gradient.</p> <p>2) Students will be able to describe active transport and how it is used for cell regulation.</p> <p>a) ATP energy is required by the cell to move substances against the concentration gradient.</p> <p>b) The cell uses the sodium-potassium pump to actively regulate ions against the concentration gradient</p> <p>c) Using vesicles, endocytosis and exocytosis use energy to move large particles into and out of the cell.</p> <p>3) Students will be able to identify ways that receptor proteins aid the cell in communication.</p> <p>a) A receptor protein binds to a specific signal molecule.</p> <p>a) The second messenger acts as a signal molecule and amplifies the signal of the first messenger.</p> <p>b) The receptor protein can act as an enzyme and speed up chemical reactions in the cell.</p> <p>c) Drugs affect the signal molecules.</p>	<ul style="list-style-type: none"> • Passive Transport • Concentration Gradient • Equilibrium • Diffusion • Osmosis • Hypertonic Solution • Hypotonic Solution • Isotonic Solution • Ion Channel • Carrier Protein • Facilitated Diffusion • Active Transport • Sodium-potassium Pump • Endocytosis • Exocytosis • Receptor Protein • Second Messenger

Test Prep Checklist

Have I completed...

Key Terms...

- ☐ **Completed** and **know** all the Word Parts for this unit and the unit before?
- ☐ **Defined** and **studied** (flash cards help) the Key Terms for the Unit?

Reading Circles...

- ☐ **Completed** each of the reading circles for each of the sections in the book?
- ☐ **Taken** and **corrected** each of the Reading Quizzes for each section in the book?

Must Knows...

- ☐ **Identified** and have **written** the appropriate Must Know on the top of each page in the packet
- ☐ **Studied, Know** and **asked questions** for each of the Must Knows for this Unit.

Notes...

- ☐ **Taken** Cornell Notes for each day of the unit.
- ☐ **Generated** at least 5 questions for each page of notes.
- ☐ **Summary** is written for each page of notes

Organization...

- ☐ Everyday's Must Knows and Homework is written on the calendar or in an assignment notebook.
- ☐ Cornell Notes are stored in binder.

Unit 4: Cell Membrane Structure and Function
“Cells and their Environment”

Define the following Key Terms...

Passive Transport

Exocytosis

Concentration Gradient

Receptor Protein

Equilibrium

Second Messenger

Diffusion

Osmosis

Hypertonic Solution

Hypotonic Solution

Isotonic Solution

Ion Channel

Carrier Protein

Facilitated Diffusion

Active Transport

Sodium-potassium Pump

Endocytosis

Word Parts Unit 4: Cell Membrane Structure and Function

Prefix

endo-		Neur/o-	
exo-		Phag/o-	
iso-			<u>Suffix</u>
Hypo-		-osis	
hyper-		-ton-	

Using your prefixes and suffixes break the word into parts and define the following:

Word	Prefixes and Suffixes Used	Meaning
hypertonic		
exothermic		
endocytosis		
phagocytosis		

Create the word based on the meaning:

Word	Prefixes and Suffixes Used	Meaning
		Concentrations of solute is equal
		Study of the nerves
		Releasing materials out of the cell

Use the word parts above to make 3 other words:

Word	Prefixes and Suffixes Used	Meaning

Define the following word:

Word	Prefixes and Suffixes Used	Meaning
Neurocytosis		

Bell Ringer Worksheet

Question:	Date:
Answer:	

Question:	Date:
Answer:	

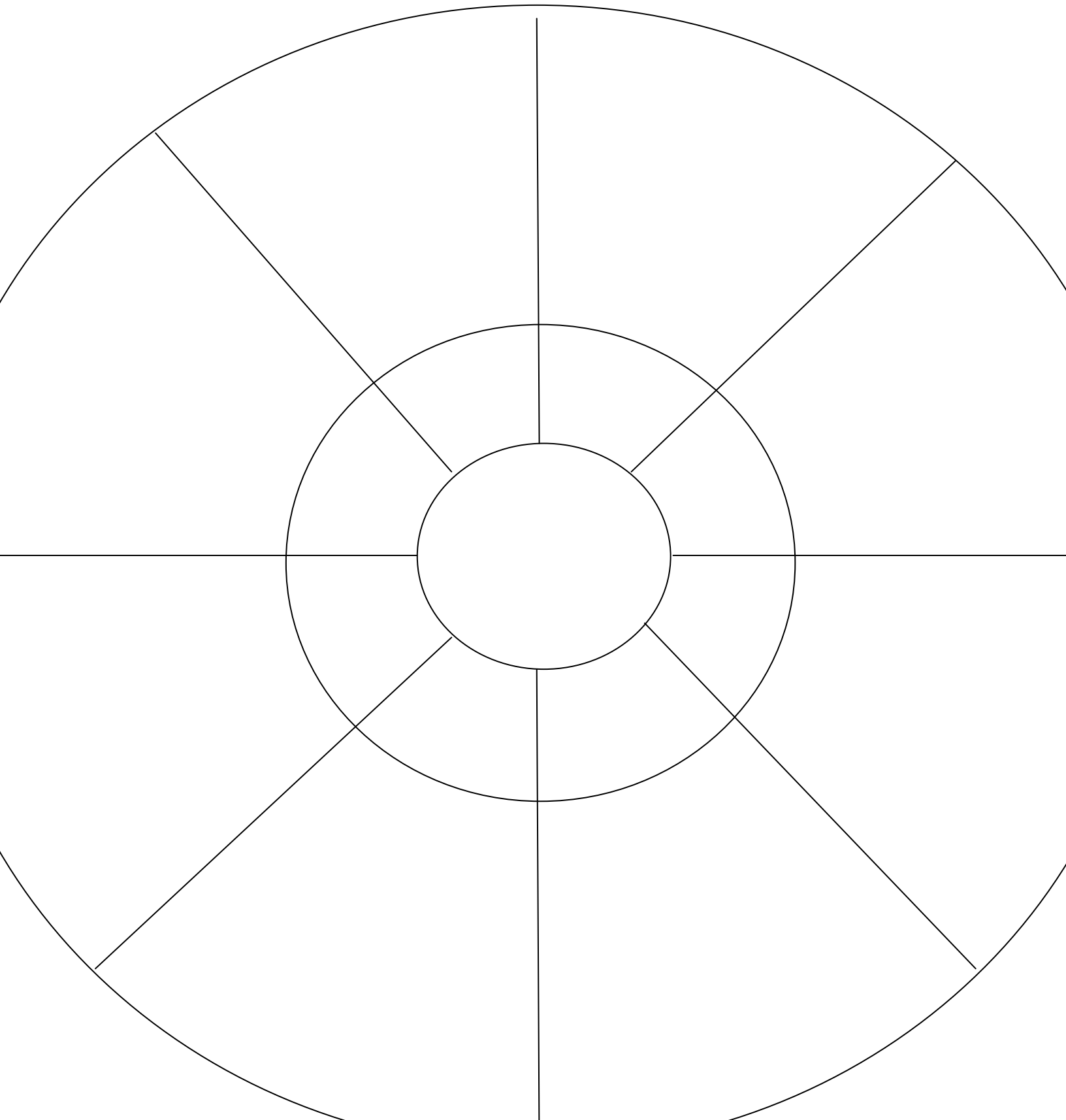
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Question:	Date:
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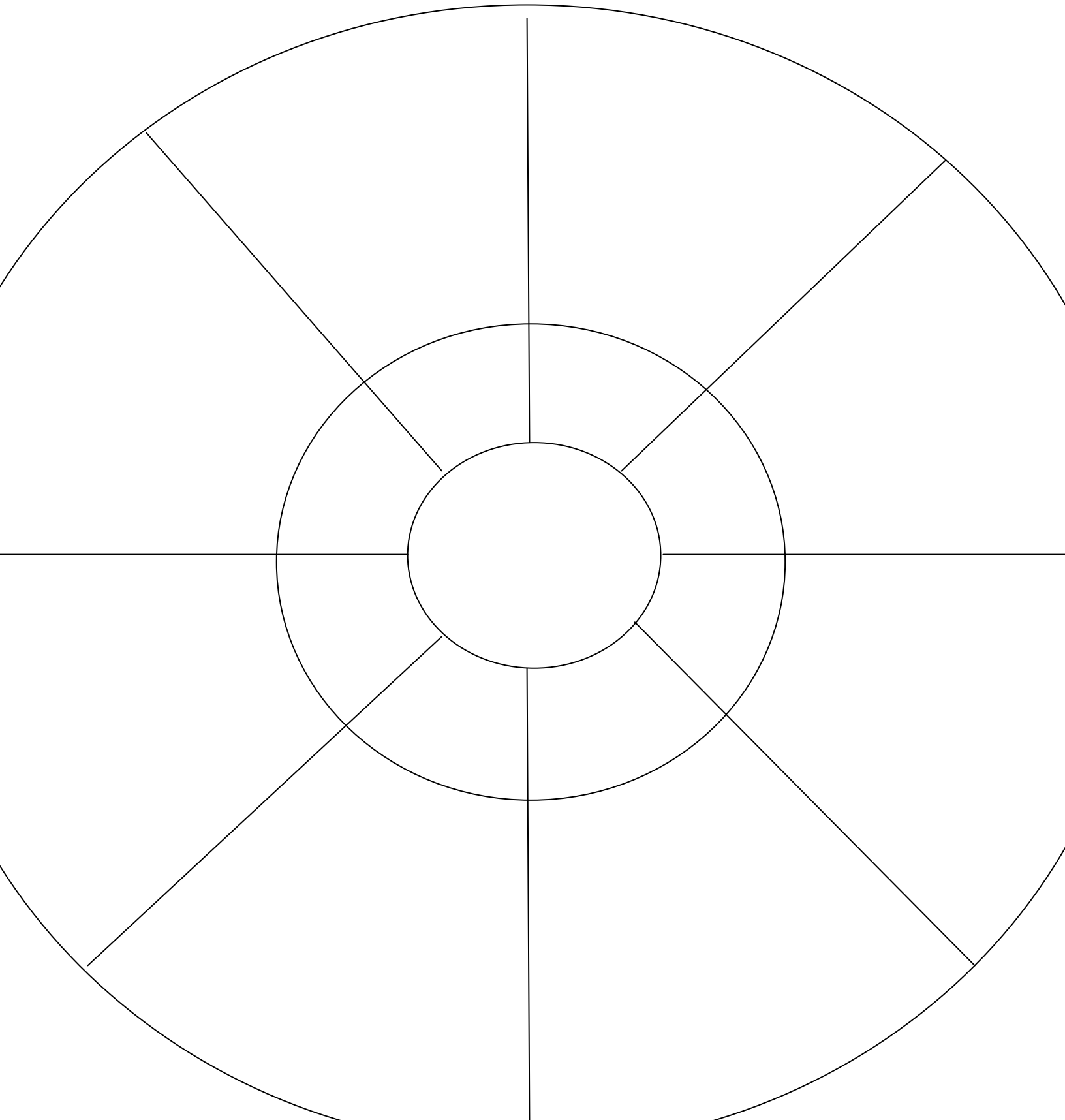
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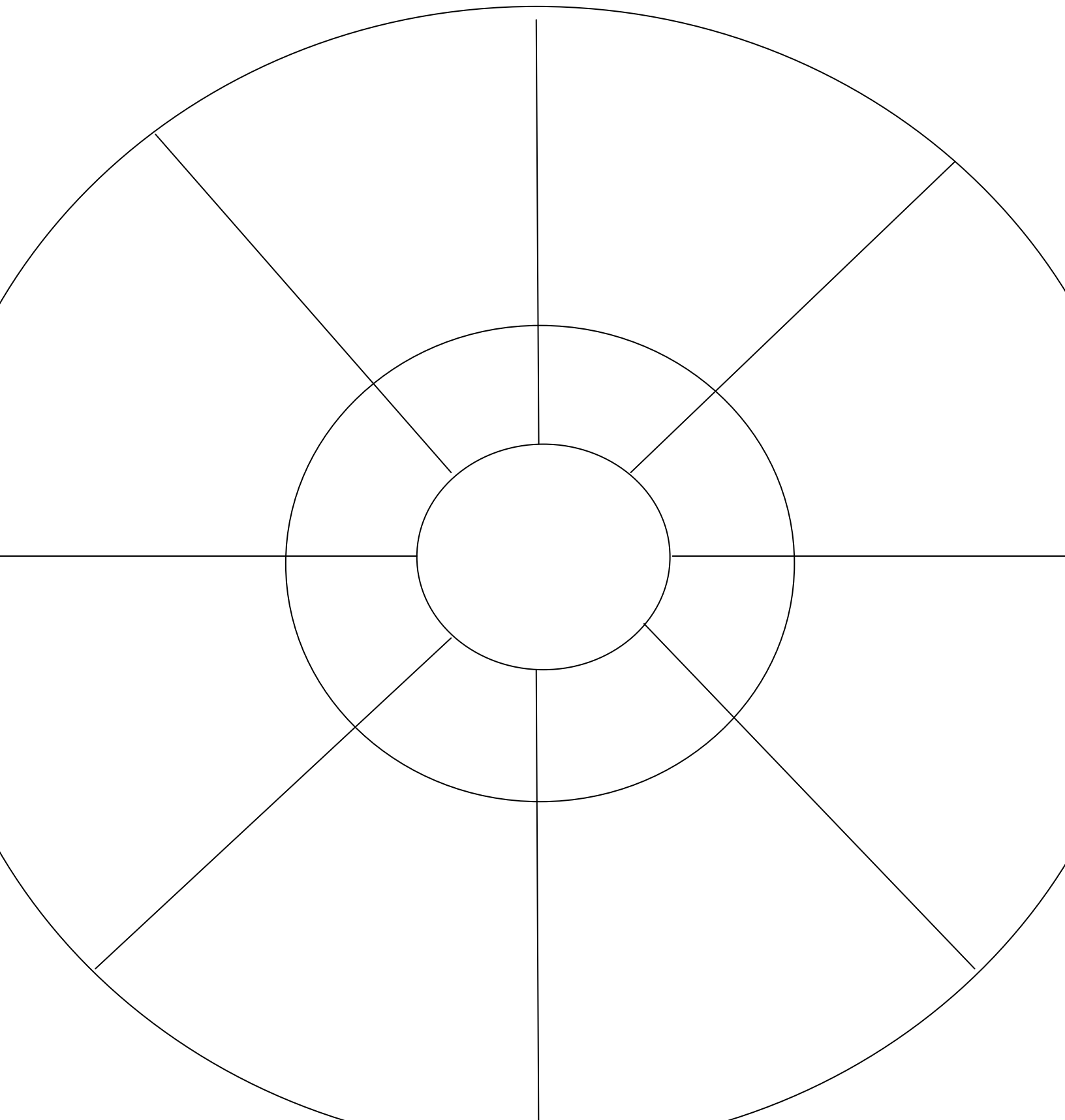
Must Knows:



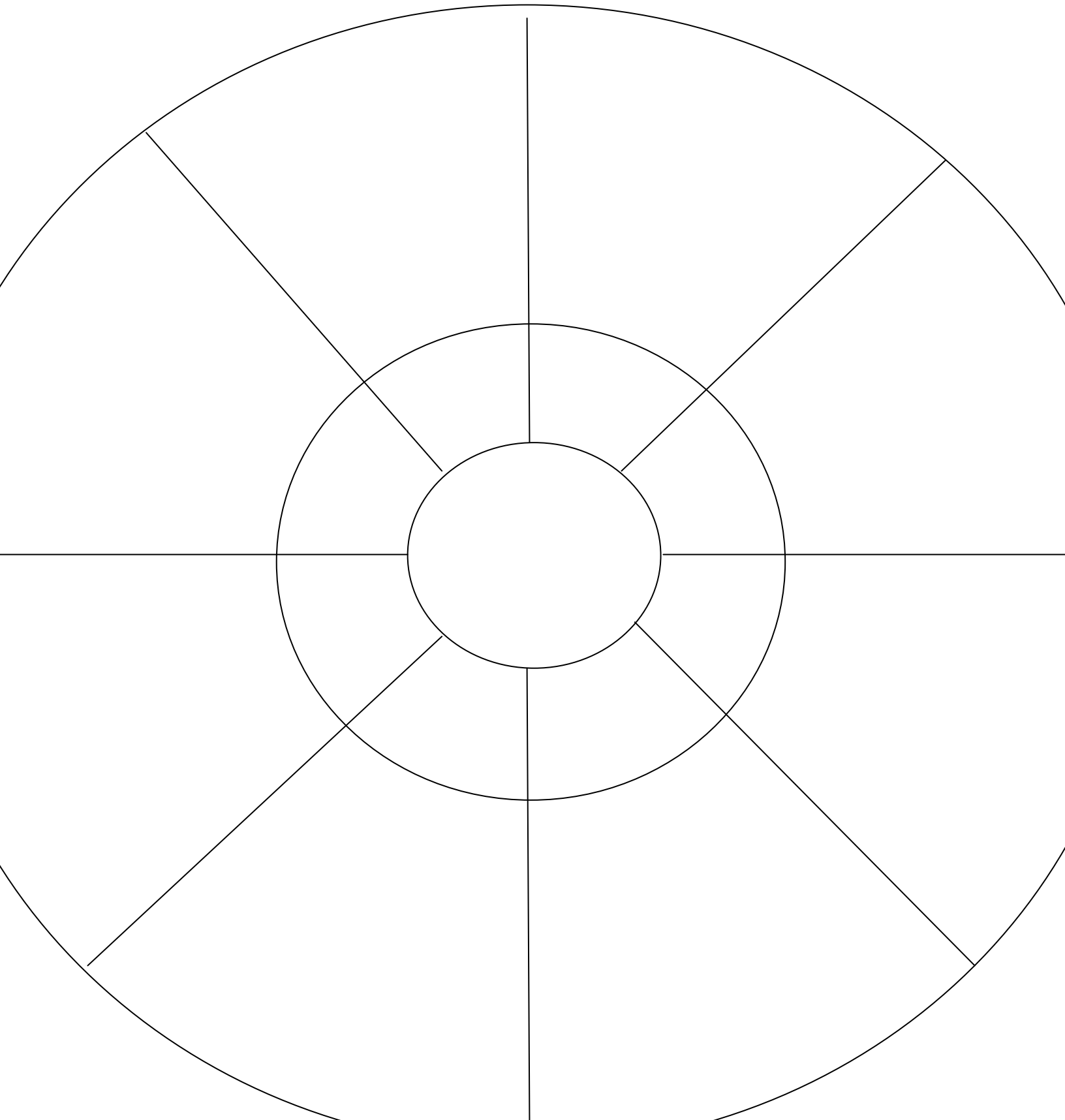
Must Knows:



Must Knows:



Must Knows:



CHAPTER

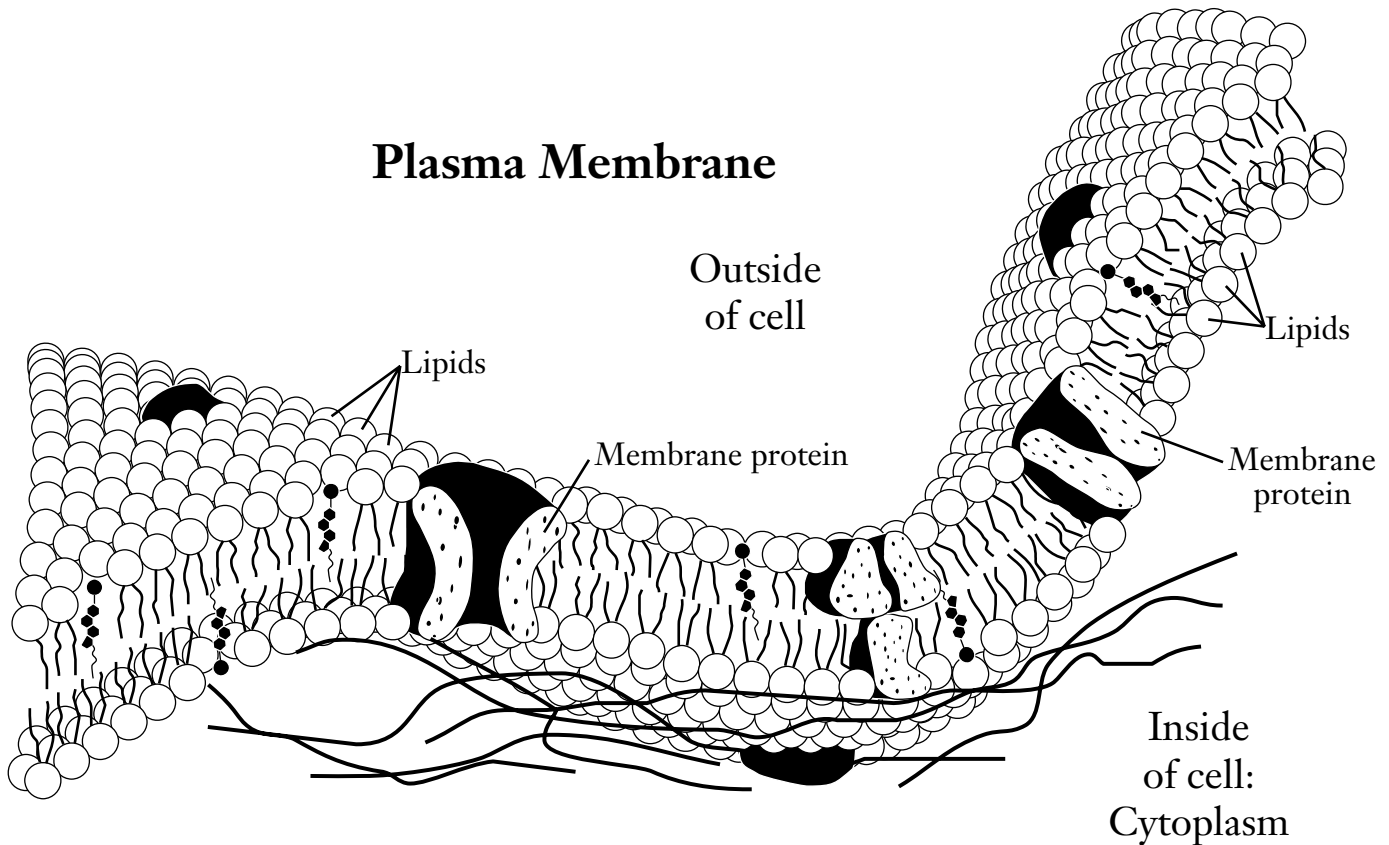
9

HOMEOSTASIS AND THE PLASMA MEMBRANE

Section 9.1 The Plasma Membrane

Study the Diagram

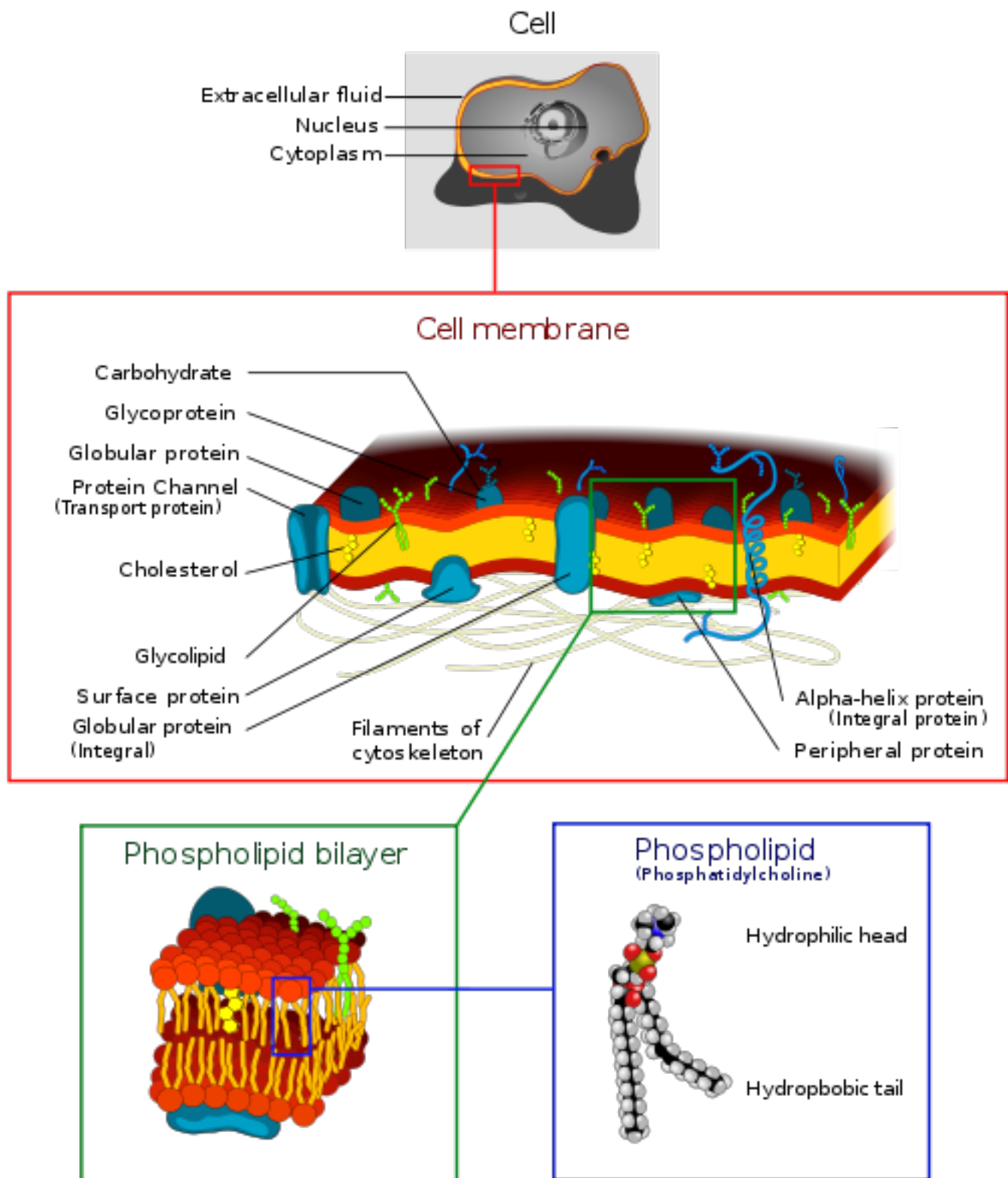
Use the diagram to answer the questions.



1. The outside layers of a plasma membrane are made up of _____ .
2. How many layers of lipids are there in the plasma membrane? _____
3. Proteins called _____ proteins are found within the plasma membrane.
4. How do the membrane proteins prevent substances from entering or exiting the cell? _____

5. How are the lipid molecules arranged in the membrane? _____

Structure of the Cell Membrane



Describing the Structure of the Cell Membrane

You are writing for a textbook company. Your job is to write about the structure of the cell membrane. Using the TELL-Con format write about how all four pictures connect to one another and the important role each of the pictures playing in the building and the function of the cell membrane.

—

This image shows a single sheet of white paper with horizontal blue ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

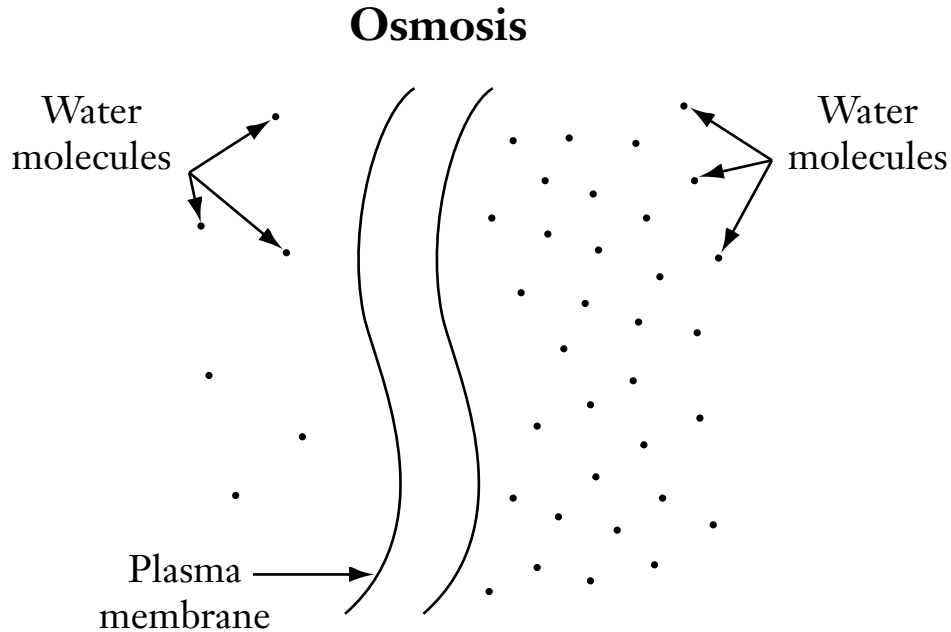
CHAPTER

9

HOMEOSTASIS AND THE PLASMA MEMBRANE

Section 9.2 Cellular Transport
Study the Diagram

Study the diagram and read the caption. Then answer the questions.



Osmosis occurs when water molecules move through the plasma membrane. The molecules move from an area of higher water concentration to an area of lower water concentration.

1. Draw an arrow across the plasma membrane in the diagram to show which way water molecules move during osmosis.
2. Osmosis is a type of diffusion. In osmosis, what substance moves? _____
3. In osmosis, the moving substance passes through a _____ membrane.
4. After osmosis, there is a balance of water molecules inside and outside the cell. Draw water molecules in the diagram above to show what the cell looks like after osmosis.

Skills Worksheet

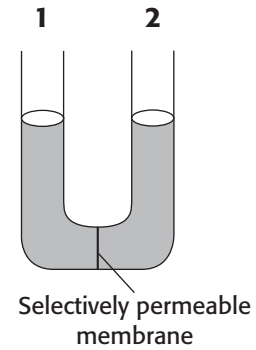
Science Skills

Predicting

Use the information below and the figure at right to answer questions 1–3.

EXPERIMENT A

A selectively permeable membrane separates the solutions in the arms of the U-tube shown at right. The membrane is permeable to water and to substance A but not to substance B. Forty grams of substance A and 20 g of substance B have been added to the water on side 1 of the U-tube. Twenty grams of substance A and 40 g of substance B have been added to the water on side 2 of the U-tube. Assume that after a period of time, the solutions on either side of the membrane have reached equilibrium.



Read each question, and write your answer in the space provided.

1. How many grams of substance A will be in solution on side 1 of the U-tube? How many grams of substance A will be in solution on side 2? Explain.

2. How many grams of substance B will be in solution on side 1 of the U-tube? How many grams of substance B will be in solution on side 2? Explain.

3. What has happened to the water level in the U-tube? Explain.

Science Skills *continued*

Use the information below to answer questions 4–6.

EXPERIMENT B

The cell membrane of red blood cells is permeable to water but not to sodium chloride, NaCl. Suppose that you have three flasks:

- Flask X contains a solution that is 0.5 percent NaCl.
- Flask Y contains a solution that is 0.9 percent NaCl.
- Flask Z contains a solution that is 1.5 percent NaCl.

To each flask, you add red blood cells, which contain a solution that is 0.9 percent NaCl.

Read each question, and write your answer in the space provided.

4. Predict what will happen to the red blood cells in flask X.

5. Predict what will happen to the red blood cells in flask Y.

6. Predict what will happen to the red blood cells in flask Z.

Analyzing the Effect of Electrical Charge on Ion Transport

Background

The electrical charge of an ion affects the diffusion of the ion across the cell membrane. Some ions are more concentrated inside cells, and some ions are more concentrated outside cells. Use the table to answer the following questions:

Ion Charges and Concentration Inside and Outside Cell		
Ion	Charge of ion	Concentration of ion outside cell : inside cell
Sodium (Na^+)	Positive	10:1
Potassium (K^+)	Positive	1:20
Calcium (Ca^{2+})	Positive	10,000:1
Chloride (Cl^-)	Negative	12:1

Analysis

1. **Identify** the ion that is more concentrated inside the cell than outside the cell.

2. **Identify** those ions that are more concentrated outside the cell than inside the cell.

3. Critical Thinking

Recognizing Relationships Do the positive charges of calcium ions and sodium ions make these ions more likely to move into or out of the cell?

4. Critical Thinking

Inferring Relationships Which ions' electrical charges oppose the direction of movement that is caused by their concentration gradient?

NAME _____

Cell Membrane Coloring Worksheet

Composition of the Cell Membrane & Functions

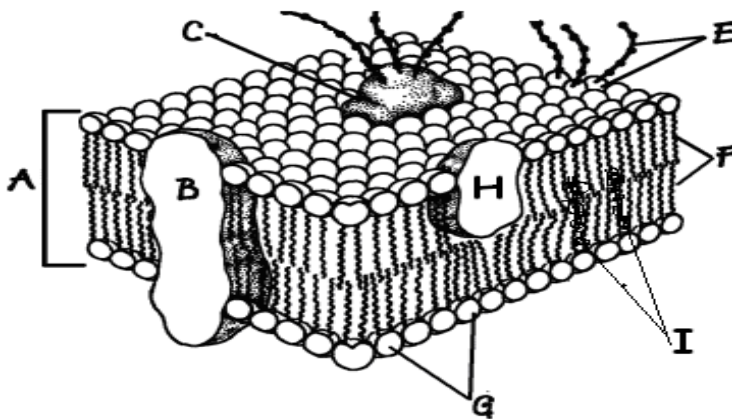
The cell membrane is also called the _____ membrane and is made of a phospholipid _____. The phospholipids have a hydrophilic (water attracting) _____ and two hydrophobic (water repelling) _____. The head of a phospholipid is made of an alcohol and _____ group, while the tails are chains of _____. Phospholipids can move _____ and allow water and other _____ molecules to pass through into or out of the cell. This is known as simple _____ because it does not require _____ and the water or molecules are moving _____ the concentration gradient. **Sketch and label** a phospholipid coloring the heads red and the tails blue.

PHOSPHOLIPID

Embedded in the phospholipid bilayer are _____ that also aid in diffusion and in cell recognition. Proteins called _____ proteins go all the way through the bilayer, while _____ proteins are only on one side. Integral proteins are also called _____ proteins. Large molecules like _____ or carbohydrates use proteins to help move across cell membranes. Some of the membrane proteins have carbohydrate _____ attached to help cells in recognize each other and certain molecules.

List 4 functions of the cell or plasma membrane:

1. _____
2. _____
3. _____
4. _____



Correctly **color code and identify** the name for each part of the cell membrane.

Letter	Name/Color	Letter	Name/Color
_____	Phospholipid bilayer (no color)	_____	Peripheral protein (red)
_____	Integral protein (pink)	_____	Cholesterol (blue)
_____	Fatty acid tails (orange)	_____	Glycoprotein (green)
_____	Phosphate heads (yellow)	_____	Glycolipids (purple)

Match the cell membrane structure or its function with the correct letter from the cell membrane diagram.

Letter	Structure/Function	Letter	Structure/Function
_____	Attracts water	_____	Repels water
_____	Helps maintain flexibility of membrane	_____	Make up the bilayer
_____	Involved in cell-to-cell recognition	_____	Help transport certain materials across the cell membrane

Osmosis and Tonicity

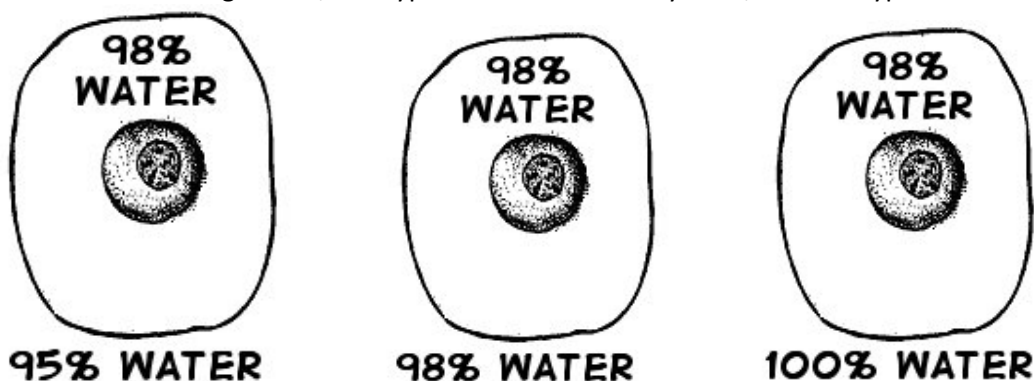
Define **osmosis**. _____

In which direction does water move across membranes, up or down the concentration gradient?

Define these 3 terms:

- a. isotonic- _____
- b. hypertonic _____
- c. hypotonic _____

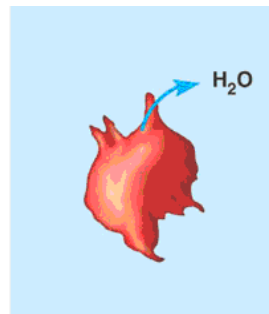
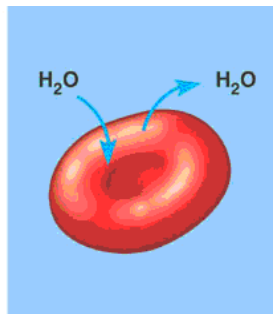
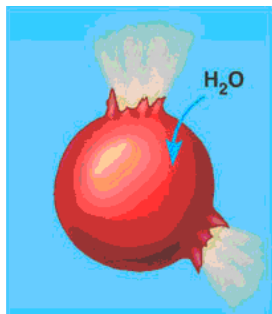
Use arrows to show the direction of water movement into or out of each cell. **Color and label** the cell in an isotonic environment light blue, the hypotonic environment yellow, and the hypertonic environment light green.

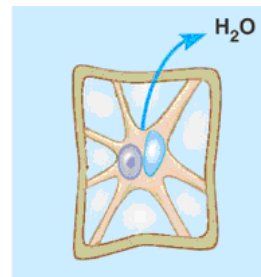
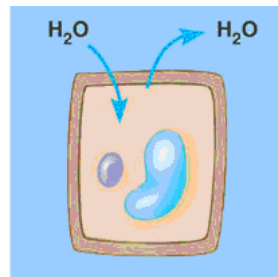
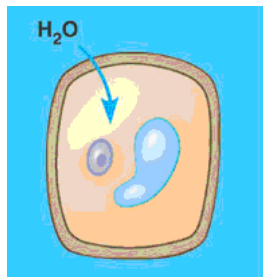


Match the description or picture with the osmotic condition:

A. Isotonic	_____ solution with a lower solute concentration
	_____ solution in which the solute concentration is the same
B. Hypertonic	_____ condition plant cells require
	_____ condition that animal cells require
C. Hypotonic	_____ red blood cell bursts (cytolysis)
	_____ plant cell loses turgor pressure (Plasmolysis)
	_____ solution with a higher solute concentration
	_____ plant cell with good turgor pressure
	_____ solution with a high water concentration

Label the tonicity for each solution (isotonic, hypotonic, or hypertonic):





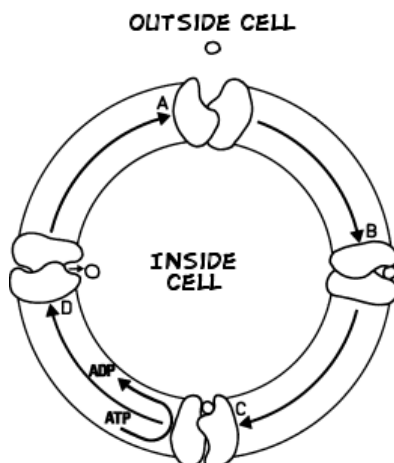
Transport Requiring Energy

What type of transport is represented by the following picture? _____

What energy is being used? _____

In which direction (concentration gradient), is the movement occurring? _____

Color the internal environment of the cell yellow. **Color and Label** the transport proteins red and the substance being moved blue.



CHAPTER

9

HOMEOSTASIS AND THE PLASMA MEMBRANE

Review the Key Terms

contractile vacuole (kun TRAK tile • VAK yew ohl)

hypertonic solution (hi pur TAH nihk)

turgor pressure (TUR gur)

isotonic solution (i suh TAH nihk)

plasmolysis (plaz MAH luh sus)

exocytosis (eks oh si TOH sus)

active transport

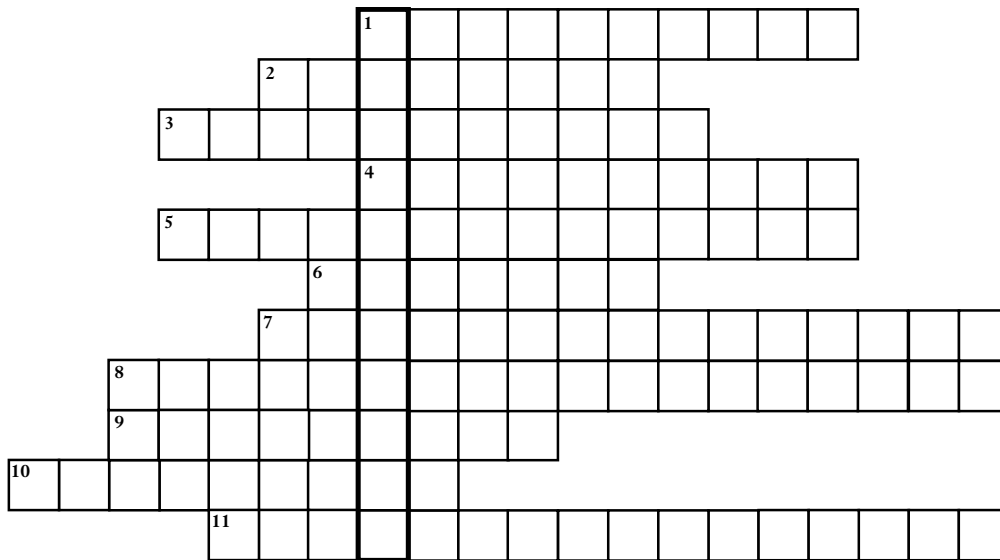
diffusion

hypotonic solution

osmosis

passive transport

Some of the Chapter 9 key terms are listed above. Review the definitions of these words. Then use the clues to complete the puzzle. The letters in the dark boxes will make up a word that tells you what you are studying in Chapter 9.



1. solution in which the concentration of dissolved substances is higher outside the cell than inside the cell
2. solution in which the concentration of dissolved substances is the same outside and inside the cell
3. results when a plant cell loses water and causes a plant to wilt
4. process that cells use to get rid of waste materials
5. pressure created by water inside a cell
6. passing of water molecules through a membrane
7. process in which a cell must use energy to transport materials across a membrane
8. organelle that squeezes extra water from a cell
9. movement of particles from an area of higher concentration to an area of lower concentration
10. solution in which the concentration of dissolved substances is higher inside the cell than outside the cell
11. movement across a membrane by diffusion

Skills Worksheet

Test Prep Pretest

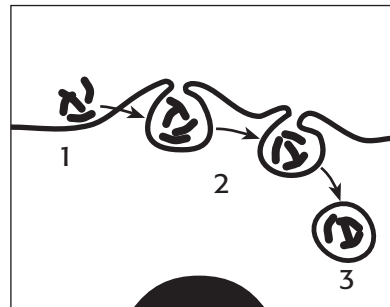
In the space provided, write the letter of the term or phrase that best completes each statement or best answers each question.

- _____ 1. When a receptor protein in a cell membrane acts as an enzyme, the receptor protein
a. changes its shape to allow the signal molecule to enter the cell.
b. causes chemical changes in the cell.
c. activates a second messenger that acts as a signal molecule within the cell.
d. changes the permeability of the cell membrane.
- _____ 2. Which of the following is NOT a characteristic of an ion channel?
a. It extends from one side of the cell membrane to the other.
b. It may or may not have a gate.
c. It is polar, so charged substances, such as ions, can pass through the nonpolar lipid bilayer.
d. It allows ions to move against their concentration gradient.
- _____ 3. When a cell uses energy to transport a particle through the cell membrane to an area of higher concentration, the cell is using
a. diffusion. c. osmosis.
b. active transport. d. facilitated diffusion.
- _____ 4. The excretion of materials to the outside of a cell by discharging them from vesicles is called
a. exocytosis. c. osmosis.
b. endocytosis. d. diffusion.
- _____ 5. The mechanism that prevents sodium ions from building up inside the cell is called
a. the sodium-potassium pump. c. diffusion.
b. endocytosis. d. exocytosis.

Complete each statement by writing the correct term or phrase in the space provided.

Question 6 refers to the figure at right.

6. The process shown in the figure
is _____.



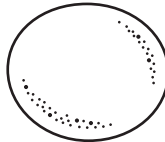
Test Prep Pretest *continued*

7. Cell-surface proteins allow a cell to _____ with other cells.
8. The _____
_____ requires energy to function.
9. When a substance moves from an area of low concentration to an area of higher concentration, the substance moves _____ its concentration gradient.
10. The movement of particles down their concentration gradient through carrier proteins is known as _____.
11. A(n) _____ amplifies the communication from a signal molecule.
12. A(n) _____
_____ in the cell membrane may be opened or closed.

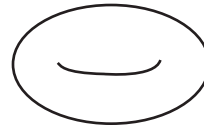
Questions 13–15 refer to the figures below.



A



B



C

13. Figure A illustrates a cell in a(n) _____ solution.
14. Figure B illustrates a cell in a(n) _____ solution.
15. Figure C illustrates a cell in a(n) _____ solution.

Read each question, and write your answer in the space provided.

16. Describe the electrical charge inside and outside a typical cell. Then explain how this affects an ion's ability to move into the cell.

Test Prep Pretest *continued*

- 17.** Suppose you want to explain a concentration gradient to someone. Create a scenario that illustrates passive transport down the concentration gradient.

- 18.** Using your understanding of osmosis, describe why putting salt on a pork chop before cooking it on a grill is likely to result in a dry, tough piece of meat.

- 19.** How is facilitated diffusion different from the other passive transport processes?

- 20.** How does a cell consume a food particle that is too large to pass through a protein channel?
